The NASA Applied Remote Sensing Training (ARSET) Program User Engagement and Best Practices

Melanie Follette-Cook

AOS Applications Seminar November 17, 2022

NASA Applied Remote Sensing Training (ARSET)

https://appliedsciences.nasa.gov/arset

The ARSET Program delivers cost-free training on the use of Earth Observations for decision making

- Our trainings are:
  - Online and in-person
  - Live, instructor-led, or self-guided
  - Provided at no cost, with materials and recordings available from our website
  - Often multi-lingual
  - Range in level from **introductory** to **advanced**

EARTH SCIENCE
APPLIED SCIENCES

CAPACITY
BUILDING

ARSET Training Themes

Disasters

Agriculture

Land

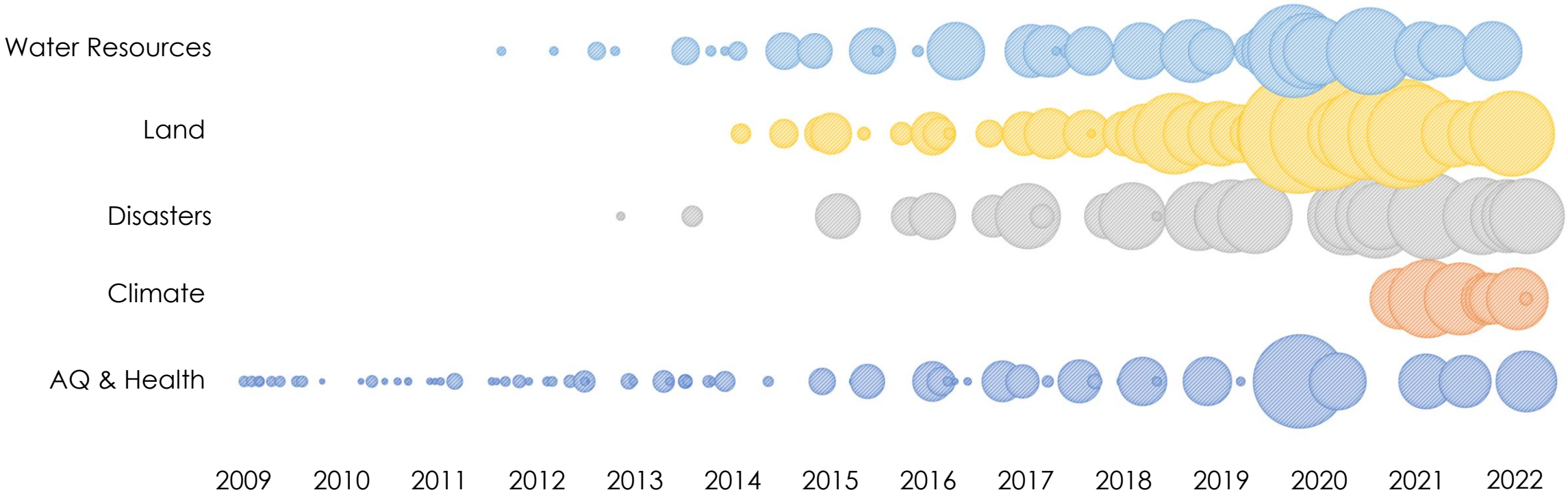
Water Resources

Climate

Health & Air Quality

ARSET Trainings 2009 - 2022

179 trainings | 95,000+ participants | 182 countries | 17,000+ organizations



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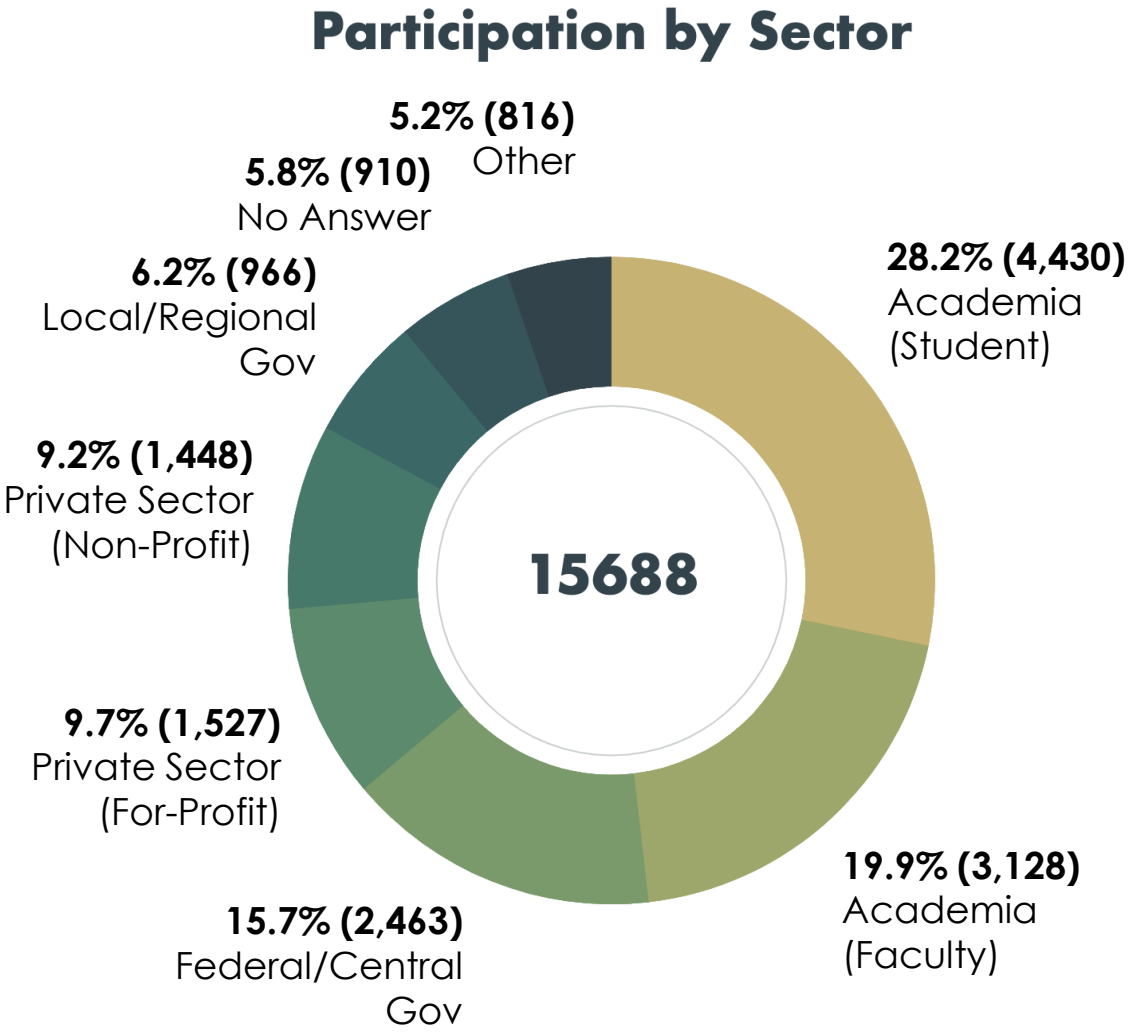
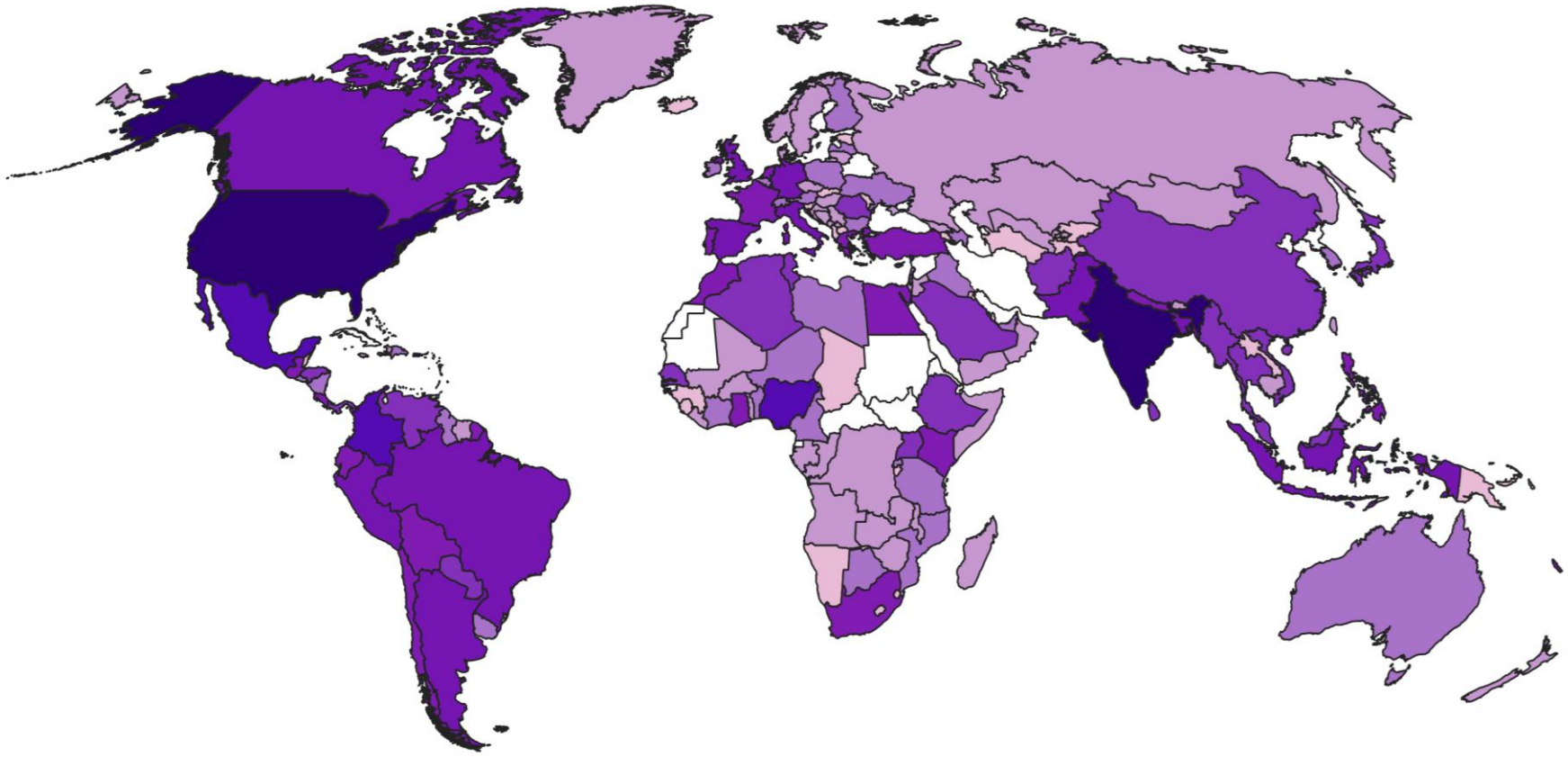
ARSET trainings serve a diverse set of communities…



- ARSET trainings are intended for policymakers, NGOs, and other applied science professionals looking to incorporate NASA remote sensing into their daily, operational activities.

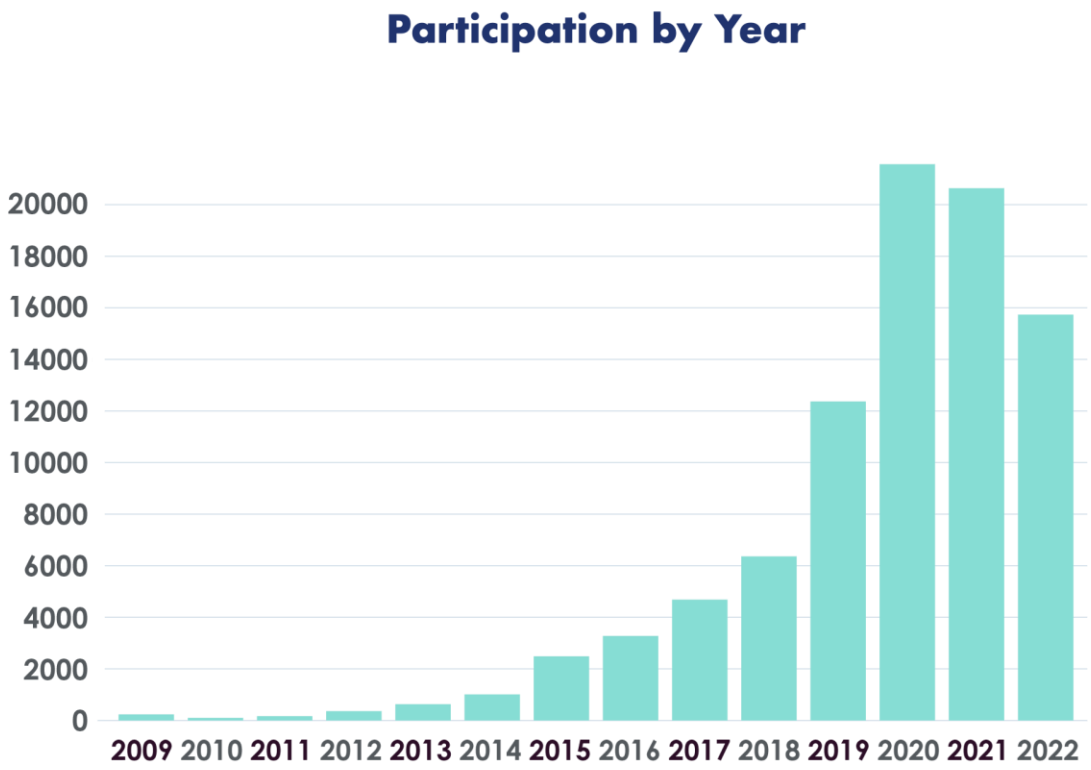
- ARSET also trains the next generation of Earth scientists.
  - Academia (both faculty and students) routinely make up 40-60% of training attendees.

Across multiple continents



- 80% of attendance is international
- Highest participation outside US is India, Colombia, and Mexico

ARSET continues to grow and reach new communities each year.



Sample 2022 ARSET Trainings

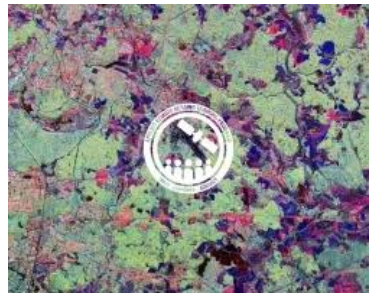
Selecting Climate Change Projection Sets for Mitigation, Adaptation, and Risk Management Applications

Disaster Assessment Using Synthetic Aperture Radar
En Español

Applications of Remote Sensing-Based Evapotranspiration Data Products for Agricultural and Water Resource Management

Accessing and Analyzing Air Quality Data from Geostationary Satellites

Evaluating Ecosystem Services with Remote Sensing

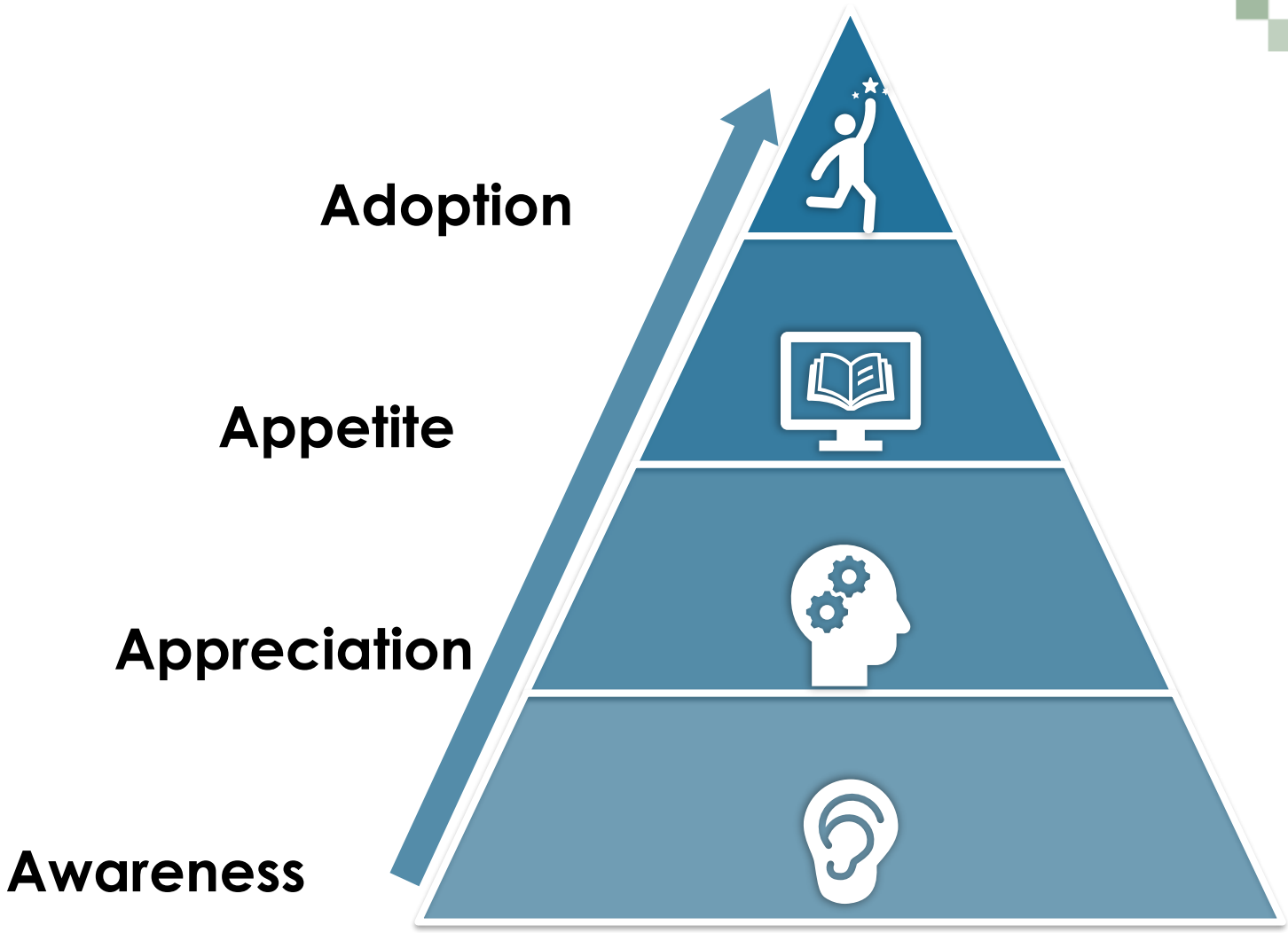


Mapping Crops and their Biophysical Characteristics with Polarimetric SAR and Optical Remote Sensing *En Español*

gram

Why training?

- Accelerate use of data from awareness, appreciation, appetite, through adoption
- Improve utility of data products and tools for users
- Communicate appropriate uses of data products
- Increasing use of data in user communities enables more informed decisions



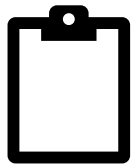
*Adapted from K. Ross

Building an Effective Training

1. Assess End-User Needs
2. Define and design the training
3. Training Promotion
4. Develop Training Material
5. Conduct the Training
6. Evaluate the Training

Assess End-User Needs

For a training to be effective, trainers need to understand the needs of participants



Survey responses

Interviews

EARTH SCIENCE
APPLIED SCIENCES

NASA-developed resources and tools

Conferences and Meetings

Define and Design the Training

1. Define training motivation and learning objectives
   - Purpose: What knowledge/skills will be gained?
   - Audience: Who the training will target
   - Impact: Value/Use of the training by the audience

2. Design and outline training
   - Determine training level (e.g., introductory vs. advanced)
   - Assess need for additional subject matter expertise
   - Consider offering at least two sessions to capture multiple time zones
   - Consider number and length of parts
   - Investigate potential case studies

Training Promotion

Identify appropriate organizations, sectors, or regions for participation in your training activity

ARSET promotes trainings to the following:

- Applied science professionals and decision-makers
- Organizations with demonstrated environmental need
- Previously unreached organizations
- A sector or geographic region with low engagement
- Organizations with potential for future collaboration
- Stakeholders with unique knowledge of their community's decision support system

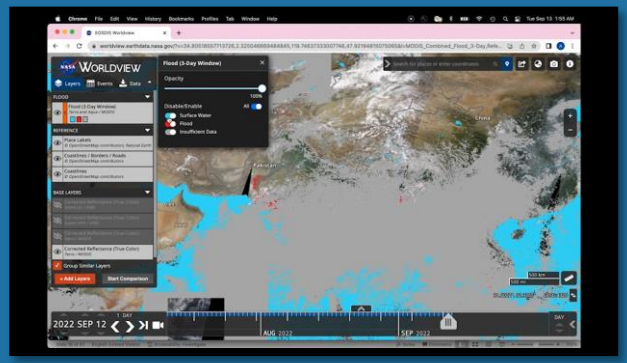
Promotion through

- Listserv
- Existing portals, groups
- Networking
- Social Media

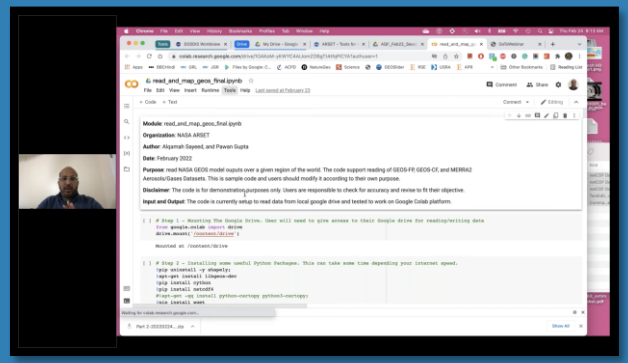
Develop Training Material

Lectures

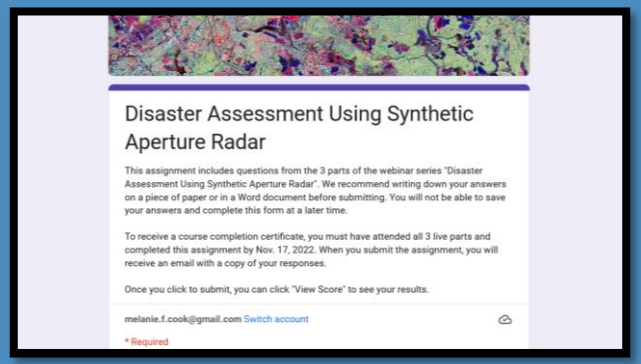
Demonstrations



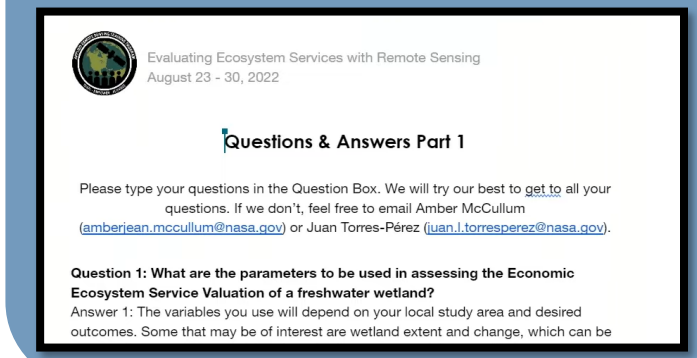
Hands-on Exercises



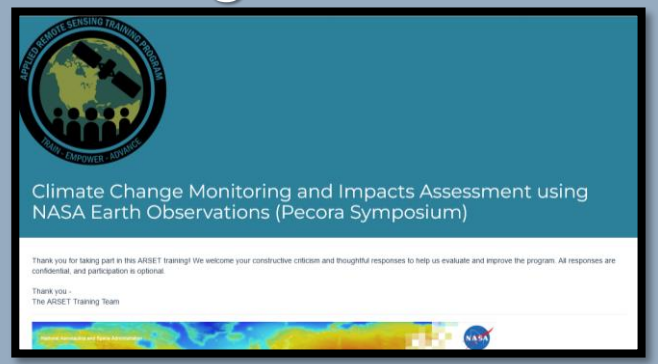
Homework



Q&A



Training Evaluation



Training Evaluation

Training evaluation is important for assessing success in meeting learning objectives, assessing training impact, and identifying future training topics and other areas for improvement.

Exit Survey

- Gather immediate impressions
- Determine if learning objectives were met
- Gather future training topics

Post Training Survey

- Sent one year after training
- Assess changes in use of remote sensing observations and tools
- Identify barriers to adoption

Interviews

- Gain deeper insights into training benefits

Sample Training Timeline

4-6 months prior

- Develop preliminary agenda
- Begin outreach
- Identify parts & case studies

3 months prior

- Finalize agenda
- Continue outreach
- Develop training content

2 months prior

- Begin registration
- Create webpage

1 month prior

- Complete training materials
- Begin translation
- Develop homework

2 weeks prior

- Finish translation
- Finalize training materials
- Send training event reminders

Day after session

- Post webinar recording online

Last day of last training

- Distribute the first survey
- Update website
- Send survey reminder 2 wks later

One year after training

- send second survey or impact assessment

Advice for AOS

- Consider using training to develop capacity in your user communities.
- Begin with user needs first and work from there.
- Accommodate different experience levels of future data users.
- Invest in making your products analysis-ready (e.g., provide readers or code to cut down on initial processing).


APPLIED REMOTE SENSING TRAINING PROGRAM
TRAIN - EMPOWER - ADVANCE

Thank you!

WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab): Who are we and what do we do?

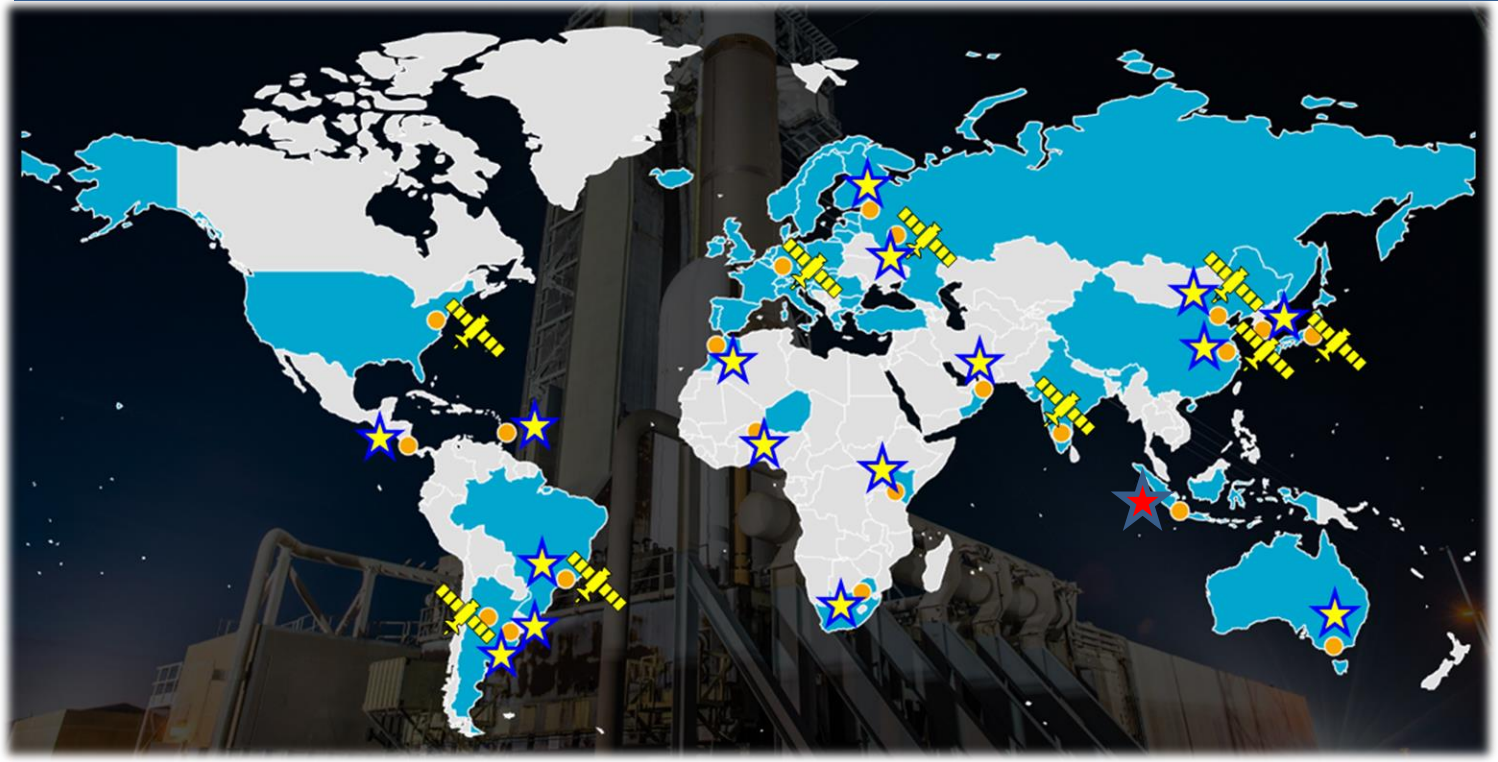
Bernie Connell (CIRA, USA) and Wen Bo (CMA TC, China)
VLab Co-Chairs
Zoya Andreeva, WMO
Marcial Garbanzo, UCR, Costa Rica (TSO)

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

WMO OMM
World Meteorological Organization
Organisation météorologique mondiale

CGMS

WMO-CGMS VLab - established in 2000



The Virtual Laboratory for Training and Education in Satellite Meteorology (VLab)

Satellite Agencies

CMA, CONAE, EUMETSAT, INPE, JMA, KMA, NOAA, ROSHYDROMET, IRSO

Centres of Excellence

Costa Rica, Barbados, Brazil, Argentina, Morocco, Niger, Oman, Kenya, South Africa, Russian Federation, Republic of Korea, China, Australia

Candidate as a New Centre of Excellence : BMKG Indonesia

Coordination Group for Meteorological Satellites (CGMS) and World Meteorological Organization (WMO)

Our Mission

To improve weather, water, climate and environmental services by enabling WMO Members to utilize satellite data.

What we do:

We provide training that promotes the interdisciplinary application of satellite data for user services.

We share knowledge, experience, methods, and tools related to access and usage of satellite data, especially in support of WMO Members that have limited resources.

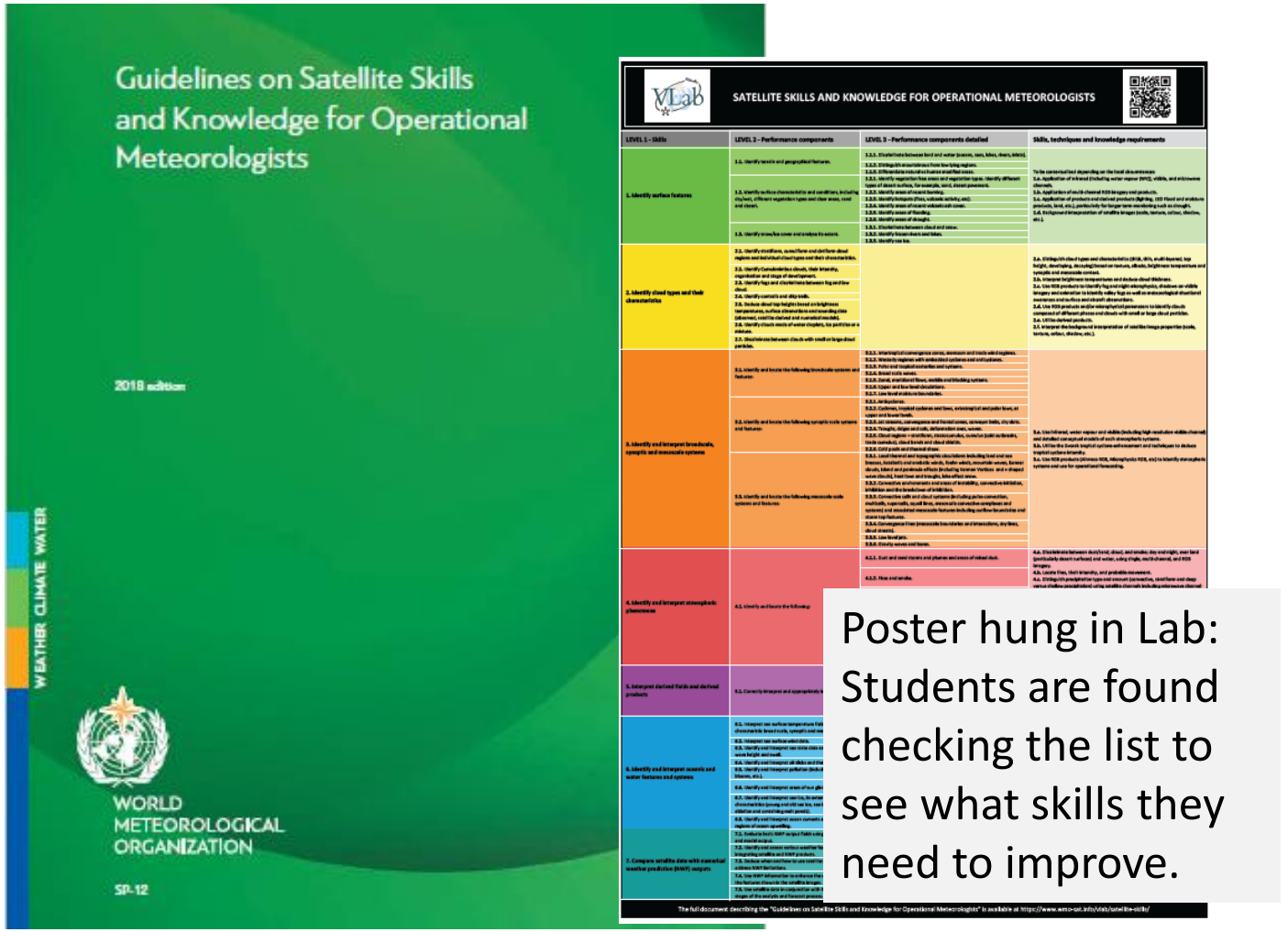
Our audience:

Mainly operational meteorologists: those performing the duties of analysis, diagnosis, prognosis and forecasting of the weather.

…and includes students, researchers, trainers, managers, and others spanning related disciplines that use weather and climate information

Coordination Group for Meteorological Satellites (CGMS)
and World Meteorological Organization (WMO)

Satellite Skills



Poster hung in Lab: Students are found checking the list to see what skills they need to improve.

- Recognition and inclusion of lightning measurements

Review of additional skills:

- Skill 8: Apply satellite-based climate data records for Meteorological Services
- Skill 9: Apply satellite-based products for Agricultural monitoring

https://library.wmo.int/index.php?lvl=notice_display&id=19843

Coordination Group for Meteorological Satellites (CGMS) and World Meteorological Organization (WMO)

How do we implement competency-based training?

1. Include Satellite Skills in the training plan

- Identify the skills that will be addressed
- State the skills in the course description
- Add the skills to the back of the certificates

2. Link the training to the existing WMO competency framework

- In Calendar announcements
- In the Library of training resources

Challenge

- Reaching wide adoption of the Satellite Skills in training.

Solution tried

- Awareness campaign.

Reported Benefits

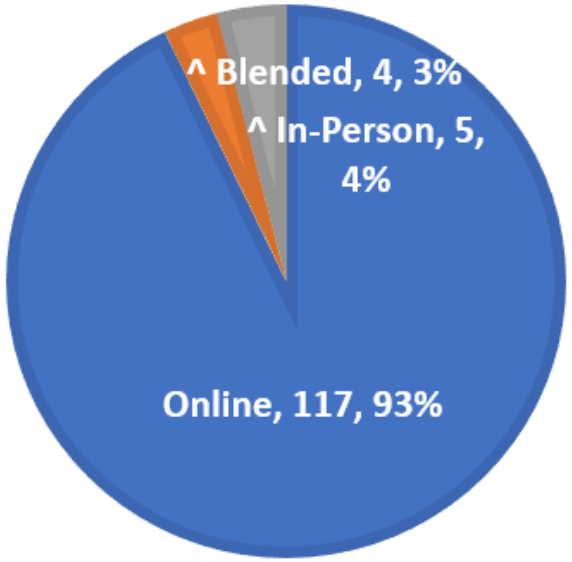
- Skills helped Trainers to write clearer learning objectives;
- Skills helped professionals to identify gaps in their skill sets.

Coordination Group for Meteorological Satellites (CGMS) and World Meteorological Organization (WMO)

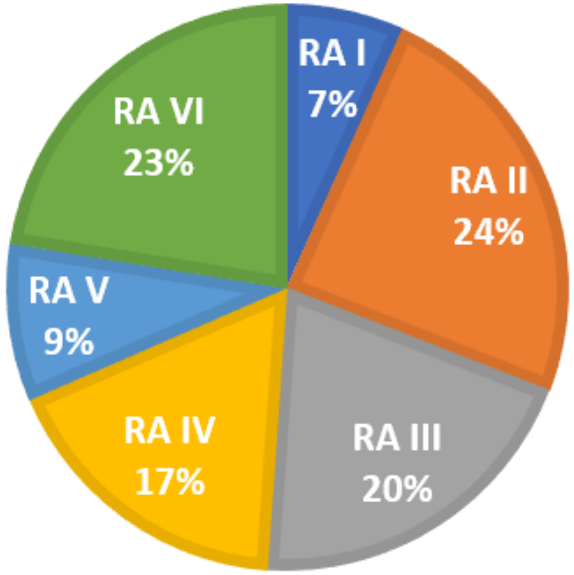
Overview of Training: December 2020 through November 2021

- A total of **126** training events were organized by VLab partners in 2021.
- About **4,250 learners** participated from all WMO Regional Associations (RA).
- Training offered in 7 languages; some events were bilingual.

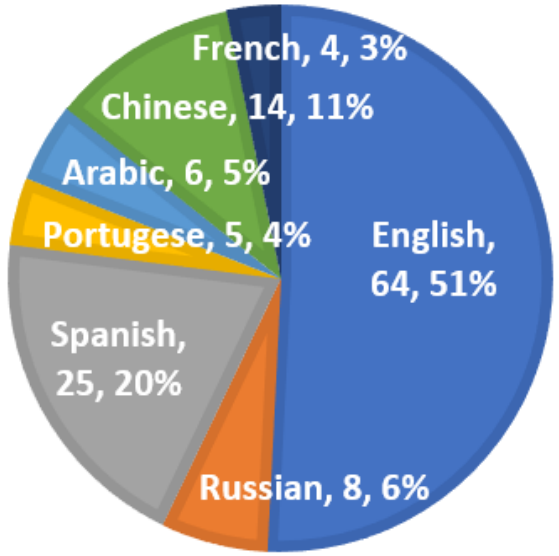
TRAINING DELIVERY MODE



TRAINING DISTRIBUTION



TRAINING LANGUAGES



Coordination Group for Meteorological Satellites (CGMS) and World Meteorological Organization (WMO)

Continuous Professional Development

1. Promote initiatives

- CoE Courses
- Themed events
- Internships
- Regional Workshops
- Hackathons
- Regional Focus Groups

2. Train the Trainers and Gather Input and Feedback

- Offer regional training of trainers
- User Conferences & Surveys
- Adopt WMO Education & Training guidelines

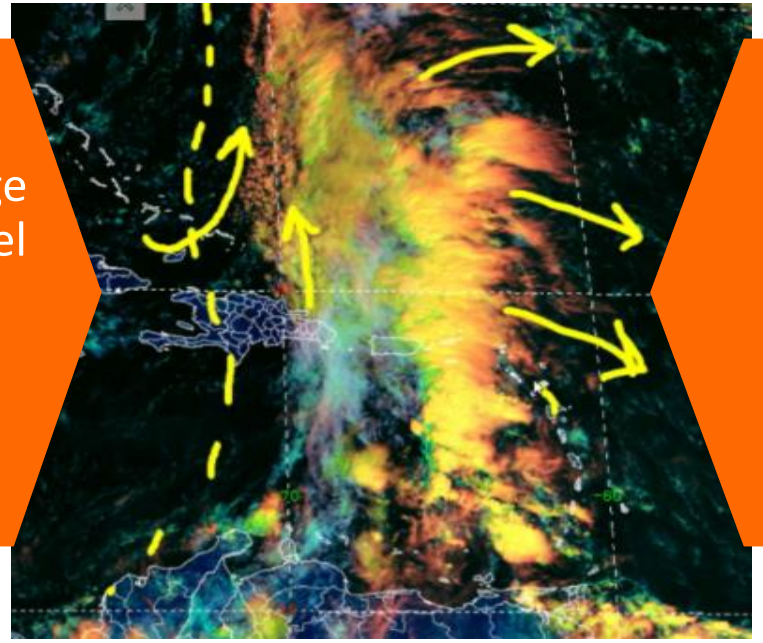
3. Global Campus

Sharing of

- Training materials
- Instructional innovations
- Assessment methods

Challenges

- Maintaining up to date knowledge and skills of operational personnel and trainers;
- Raising awareness of developments in satellite meteorology.



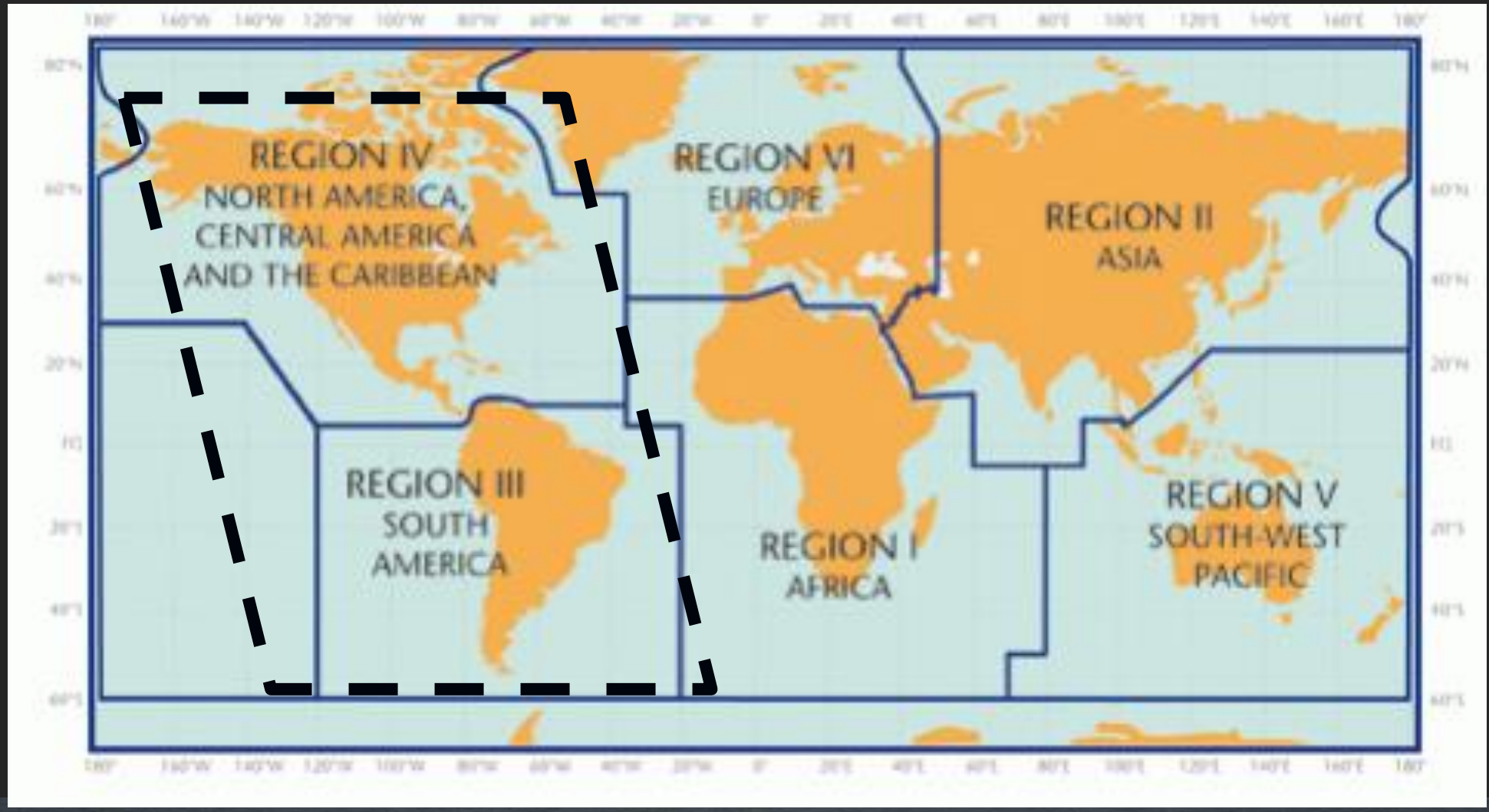
Approaches

- Work closely with subject matter expertise;
- Foster communities of practice;
- Encourage sharing of training resources.

WMO OMM

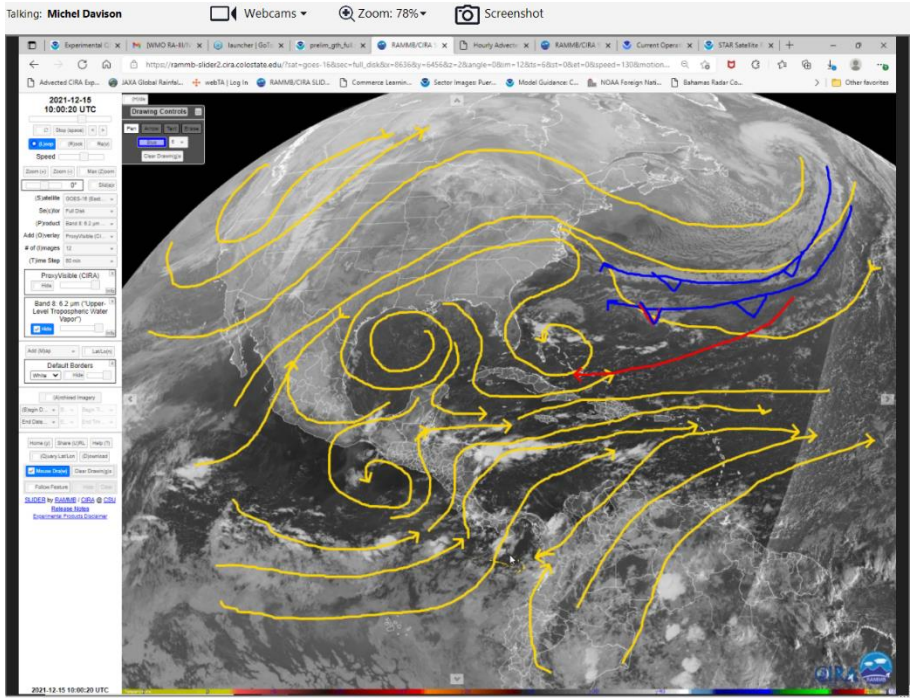
CGMS

WMO Regions


REGION IV
NORTH AMERICA,
CENTRAL AMERICA
AND THE CARIBBEAN
REGION VI
EUROPE
REGION II
ASIA
REGION III
SOUTH
AMERICA
REGION I
AFRICA
REGION V
SOUTH-WEST
PACIFIC

What is a Focus Group?

- **A long term Community of Practice that brings together diverse stakeholders**
- **Informal learning (no participation certificates are offered)**

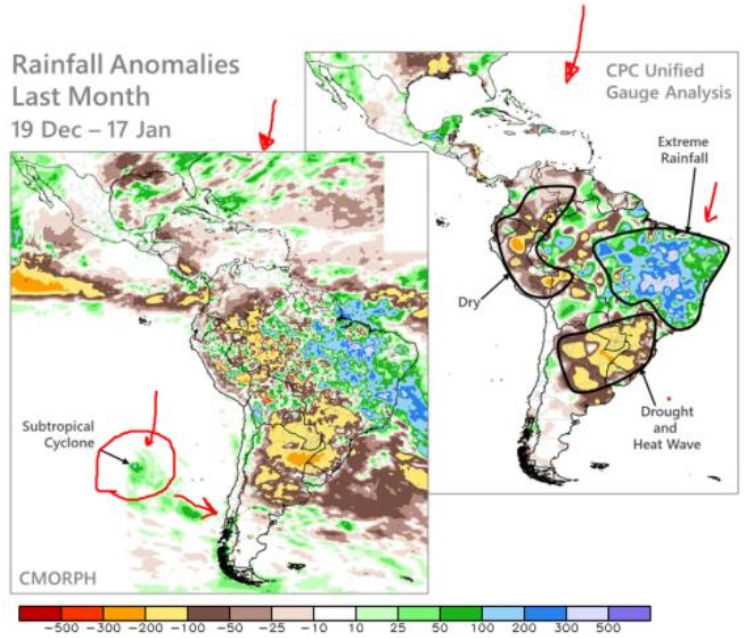


Synoptic Overview

Too many topics to address during this session:

Dec 30	Fires in Colorado ✓
Dec 23 -Jan 11	Extreme Rainfall in Brasil, persistent SACZ events ✓
Jan 10-17	Heat wave amid drought in the Parana/La Plata Basin ✓
Jan 11-12	Subtropical Cyclone off the coast of Chile ✓
Jan 15	Tonga Volcano Explosion ✓

Review of significant events over the past month



Climate Indices & Summaries

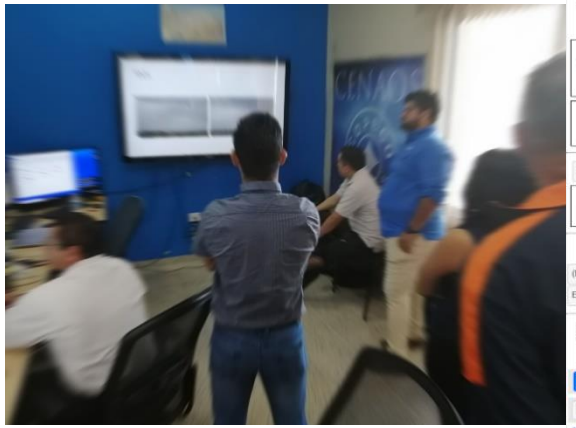
WMO OMM

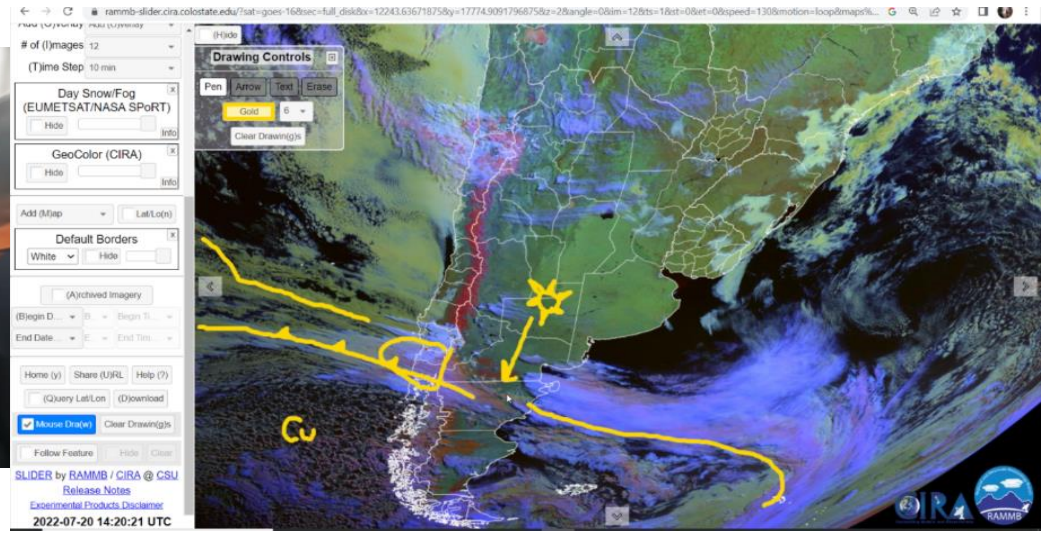
CGMS

Continued Engagement through Virtual Monthly Regional Focus Group Weather and Climate Discussions
Example for the Americas and the Caribbean

CIRA + NCEP + CIMH + UCR + INPE + SMN & UBA = VLab

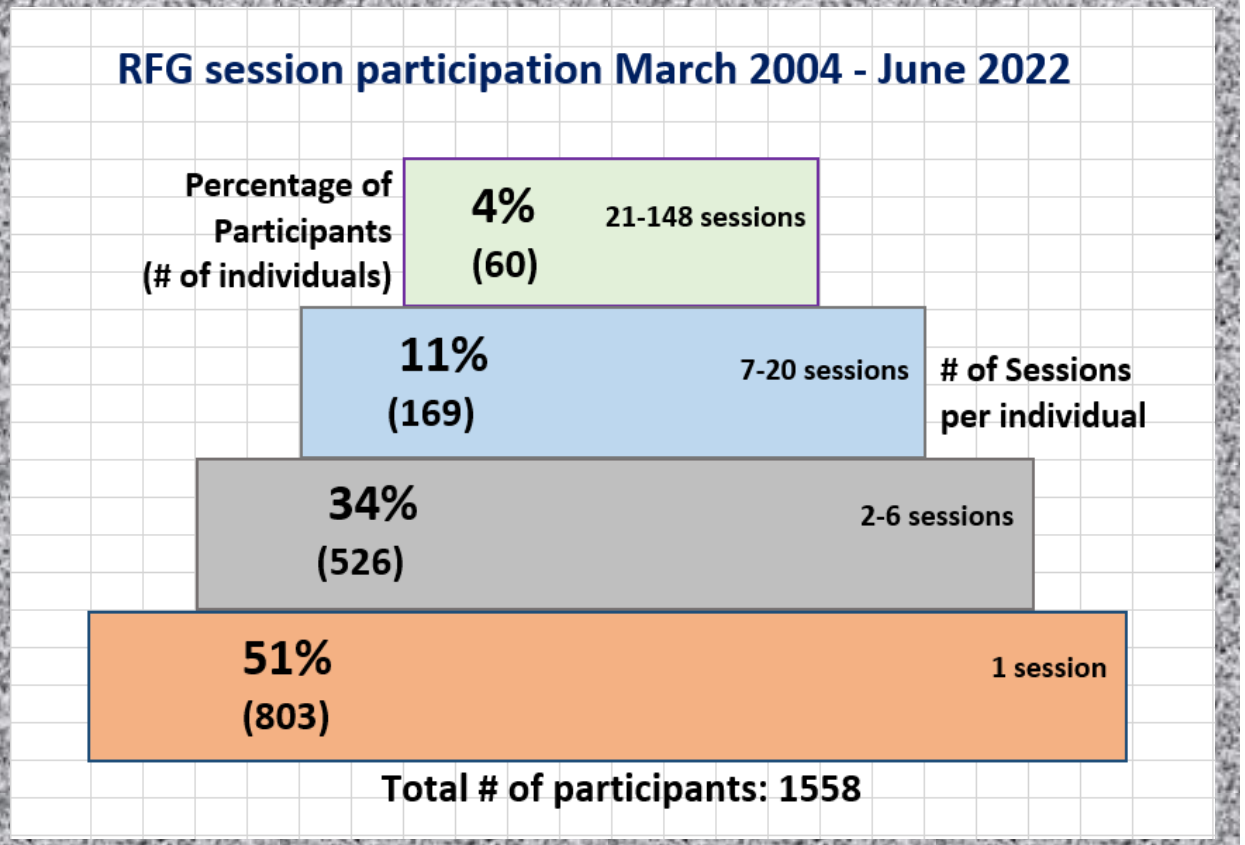
WPC Int. Desks

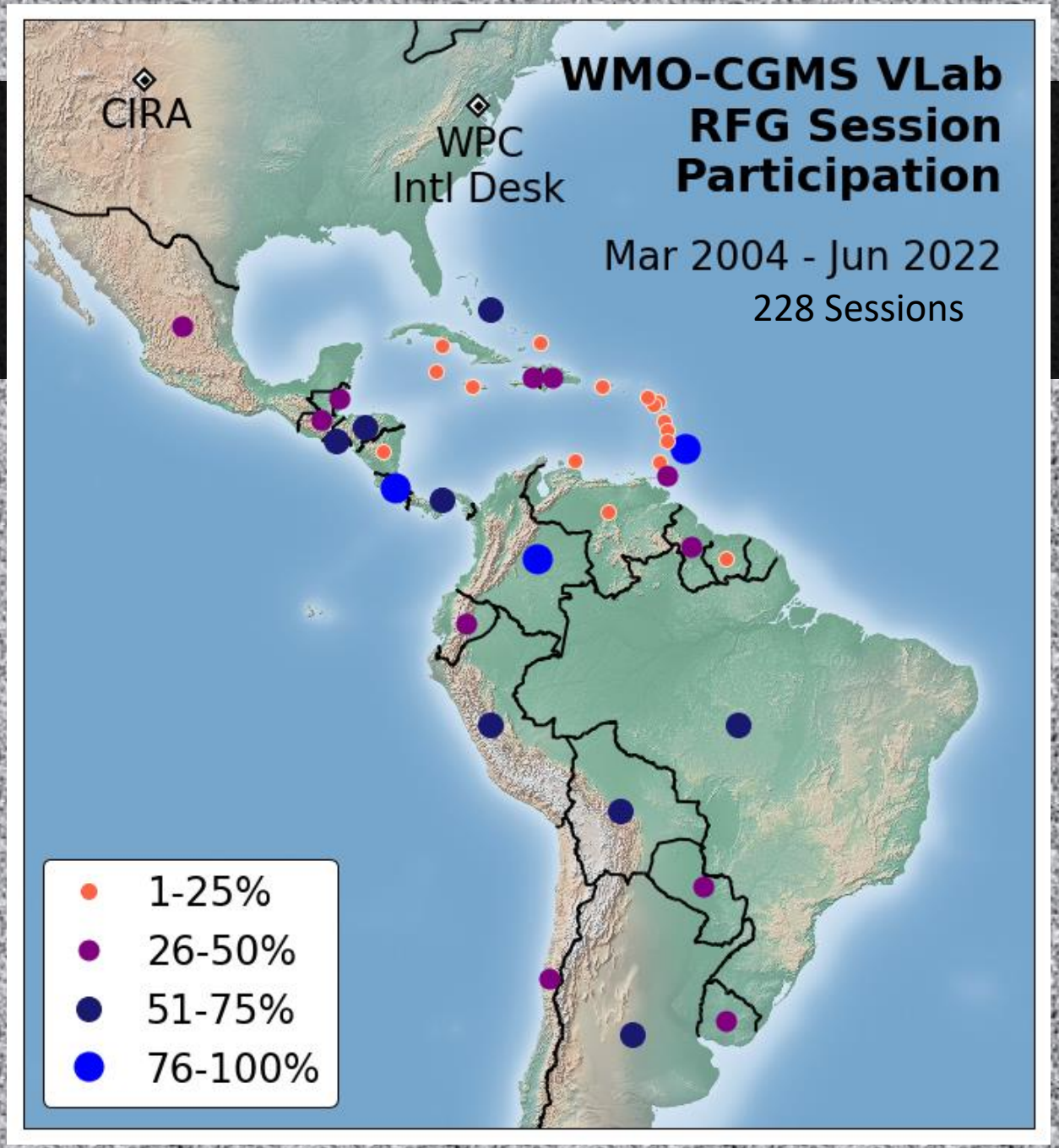




http://rammb.cira.colostate.edu/training/rmtc/focusgroup.asp

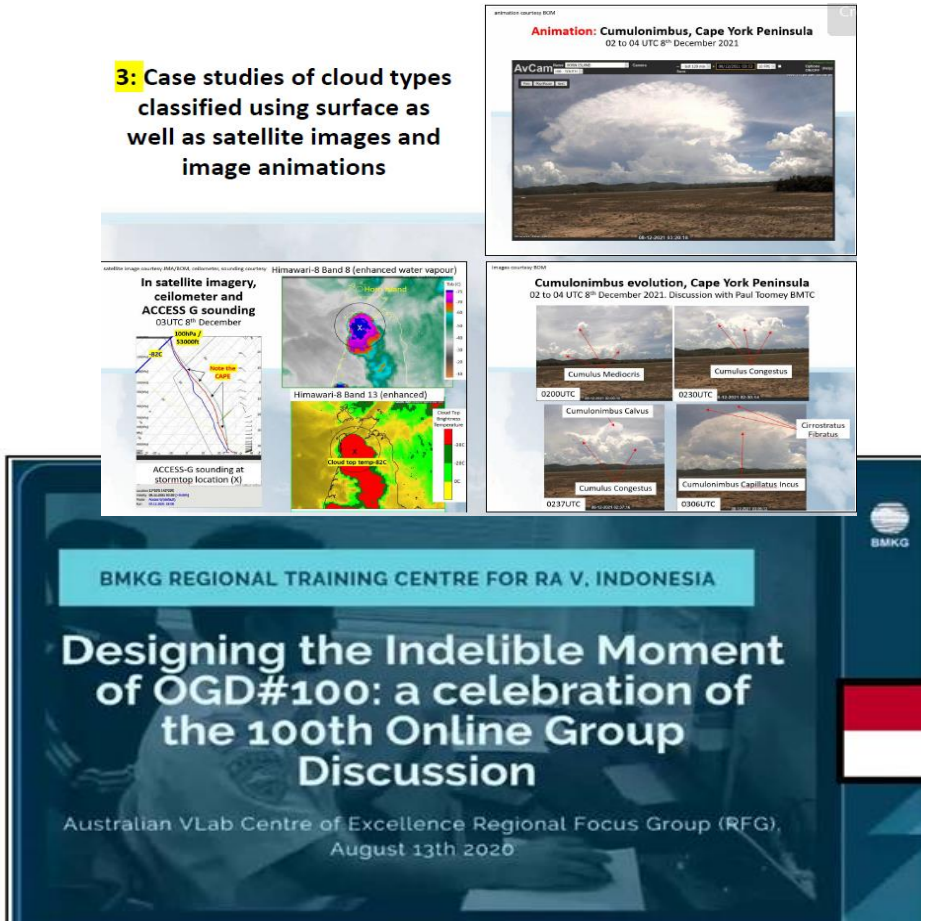
Building Capacity and Community





Other Monthly Regional Focus Groups Discussions

➢Australian VLab CoE: October 2013 – 2022 >>> ***9 years***



➢Africa

➢***Indonesia***

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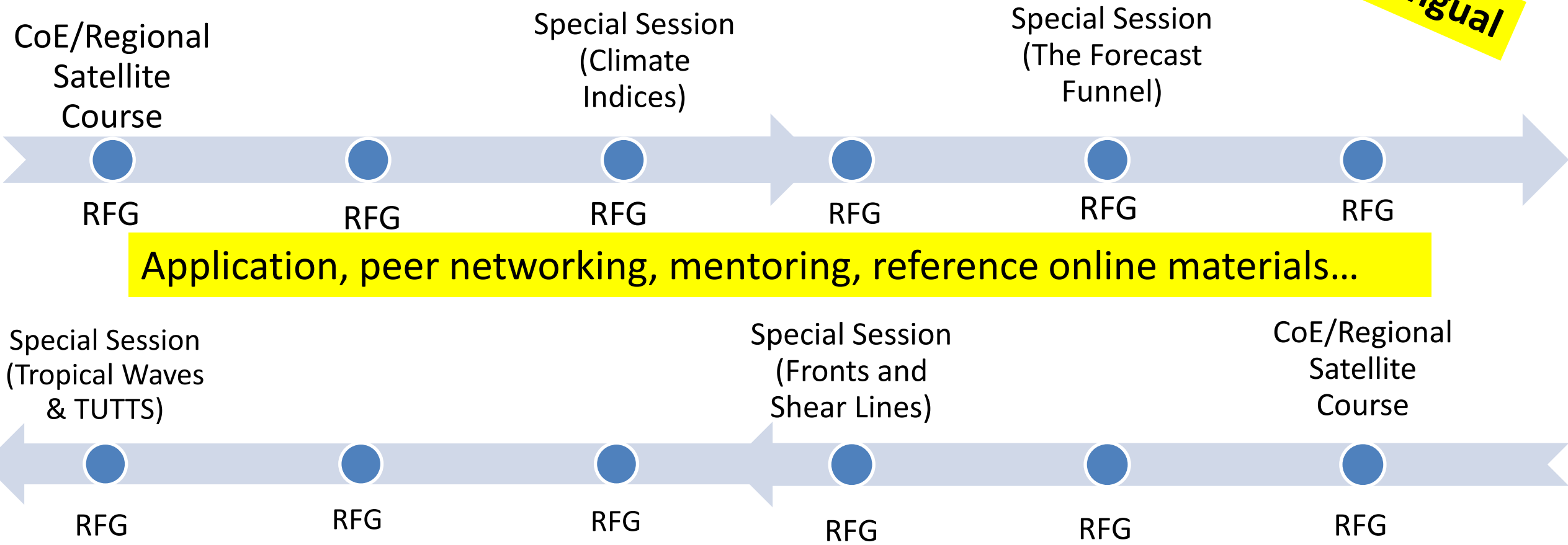
Make the information stick with blended learning approaches

bilingual



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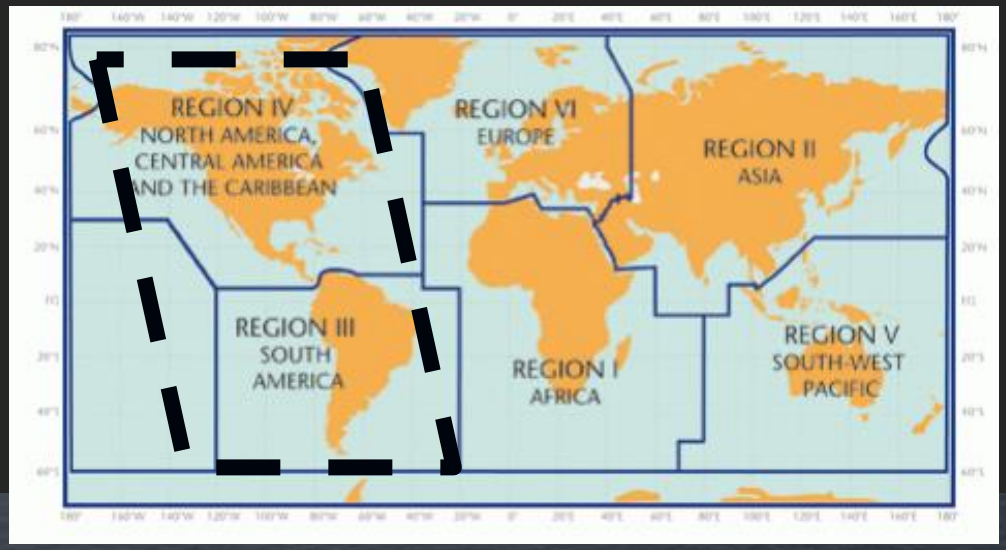
Collaborations = Successes

- Increased Country, Organizations, and Individual Participation = Community of Practice
- Colleagues and Previous Participants as Facilitators and Instructors of sessions.
- Students and early career professionals have moved into forecaster, instructor/trainer, researchers, manager, and senior professional roles.
- Promotion of:
  - Peer to peer interaction
  - Communication across boundaries
  - Continuing Professional Development
  - Interdisciplinary Linkages



Collaborations for enhancing training

Community for the **A**dvancement of **L**earning in **Met**eorology *and* related disciplines

- The CALMet XIV Conference: “Bringing Together the Best of Online to Learning”
- Host: Servicio Meteorológico Nacional, Argentina (VLab CoE) ***VIRTUAL!***
- 56 contributors from all Regional Associations of WMO.
- 260 educators, trainers and managers from universities, research institutions, and National Meteorological and Hydrological Service registered for the event.

http://www.calmet.org/

Coordination Group for Meteorological Satellites (CGMS)
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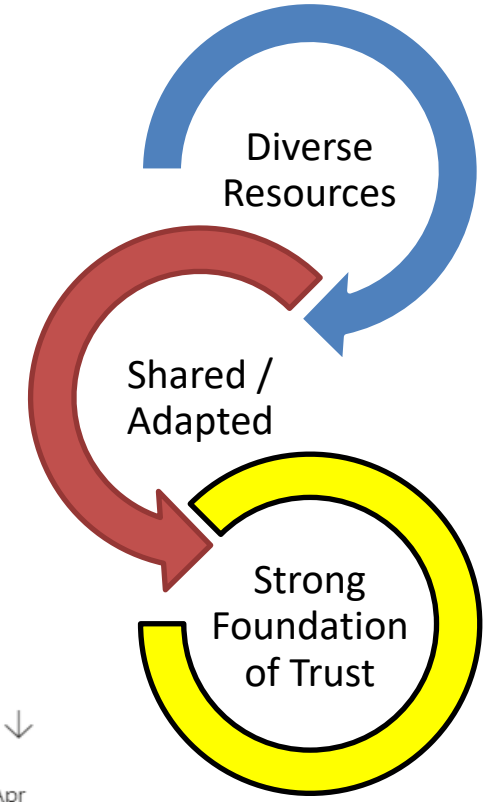
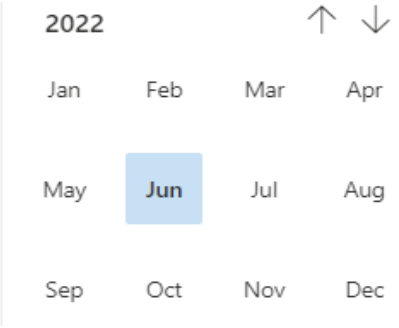
WMO Education & Training Program and the Global Campus Initiative

- WMO Global Campus: Library of resources & Calendar
- WMO Capacity Development Strategy
  - Promote Impact based forecast messaging





https://community.wmo.int/calendars-and-resources

Coordination Group for Meteorological Satellites (CGMS)
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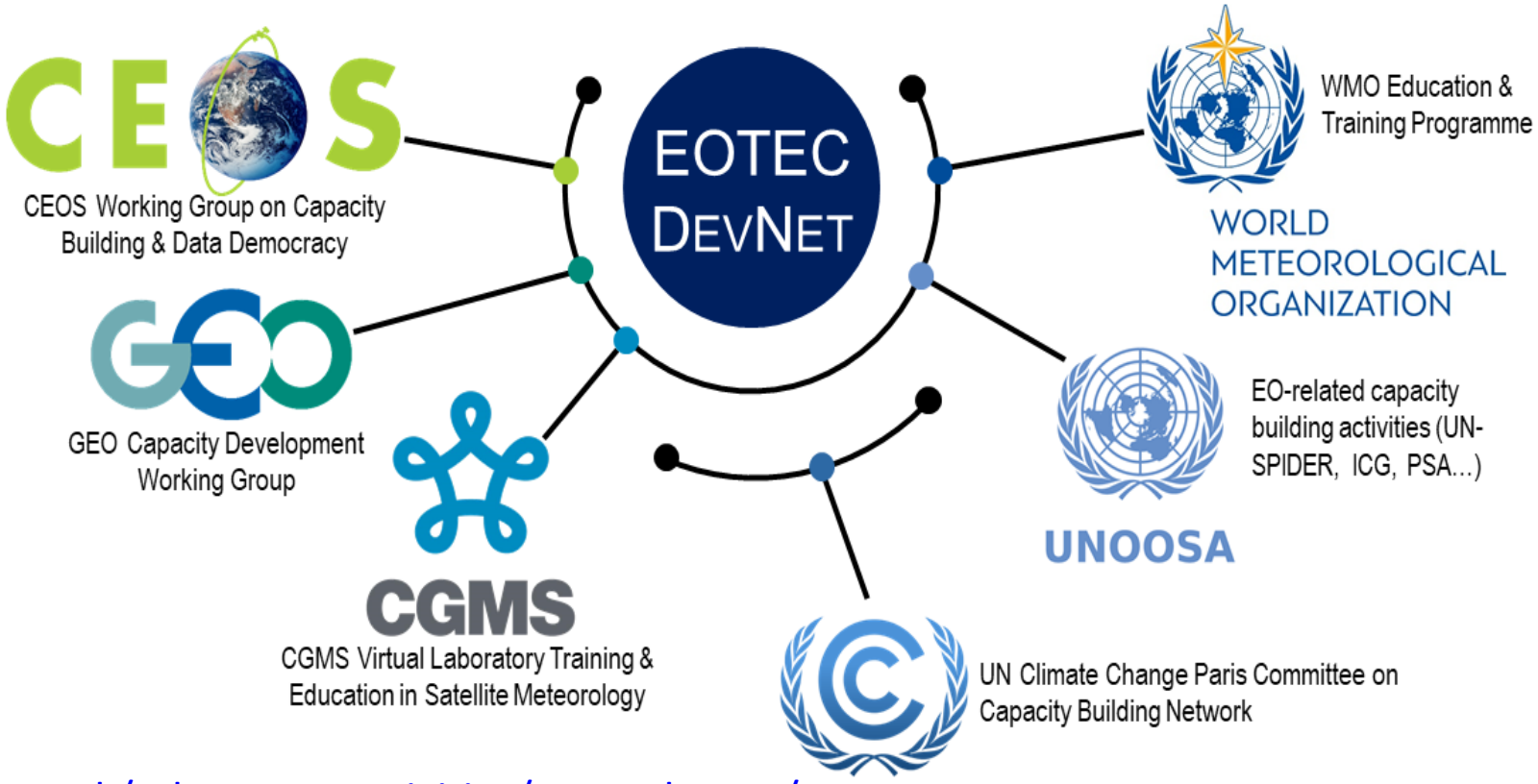
We are finding our place among other Global Efforts

The Committee on Earth Observation Satellites (CEOS)
Earth Observation Training, Education, and Capacity Development Network



https://ceos.org/ourwork/other-ceos-activities/eotec-devnet/

Coordination Group for Meteorological Satellites (CGMS)
and World Meteorological Organization (WMO)

Examples of small things that make a big difference to enhance engagement.

- Make sure the providers put color bars and units on products!
- Use level 0, 1, 2 etc. to describe product, not ‘catchy’ nicknames
- If you provide information, think simple language:
  - It is easier to understand and pass on to users.
  - It can be translated to other languages more readily.
- Provide reasonable information on Imagery/Product latency.
- Rain rate vs accumulation confusion.
- Join in a workshop or RFG session to see how they operate. If applicable, volunteer to present, particularly for languages other than English.

Thank You!

WMO-CGMS VLab https://www.wmo-sat.info/vlab/

CIRA/NOAA/VLab
https://rammb2.cira.colostate.edu/training/rmtc/

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